HP StorageWorks Disk Array XP128 site preparation guide

fifth edition (July 2005)

part number: A7876-96006

This guide describes how to prepare a site for the installation of an HP Disk Array XP128.

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HP StorageWorks Disk Array XP128: Site Preparation Guide

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About this guide

This guide is for anyone preparing a site for physical installation of an HP Disk Array XP128. For information about the operation of the HP Disk Array XP128, refer to the owner's guide.

Related documentation

HP provides the following related documentation:

- *HP StorageWorks Disk Array XP128: Owner's Guide*
- *HP StorageWorks Remote Web Console XP User Guide*
- *HP StorageWorks Command View XP Advanced Edition User Guide*
- *HP StorageWorks Disk Array XP Operating System Configuration Guide* (various operating systems)

To locate these documents, to learn more about HP software products, or to obtain software updates, visit the HP web site:

http://h18006.www1.hp.com/storage/xparrays.html

HP storage web site

For the most current information about HP StorageWorks XP products, visit: http://h18006.www1.hp.com/storage/arraysystems.html.

For information about product availability, configuration, and connectivity, contact your HP support representative.

Helpful web sites

For third party product information, see the following web sites:

http://www.hp.com/go/storage

http://www.hp.com/support

HP technical support

In North America, call technical support at 1-800-633-3600, available 24 hours a day, 7 days a week.

Outside North America, call technical support at the location nearest you. The HP web site lists telephone numbers for worldwide technical support at: http://www.hp.com/support. From this web site, select your country.

Collect the following information before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed questions

For continuous quality improvement, calls may be recorded or monitored.

HP strongly recommends that customers sign up online using the Subscriber's choice web site at http://www.hp.com/go/e-updates. Subscribing to this service provides you with email updates on the latest product enhancements, newest drivers, and firmware documentation updates as well as instant access to numerous other product resources.

HP sales and authorized resellers

To reach HP sales or find a local authorized reseller of HP products, call 1-800-282-6672 or visit the HP How To Buy web site:

http://welcome.hp.com/country/us/en/howtobuy.html

You can also find HP sales and resellers at http://www.hp.com. Click **Contact HP**.

Document conventions and symbols

Table 1. Document conventions

Convention	Element
Blue text (Figure 1)	Cross-reference links
Bold	Menu items, button names, key names, tab names, and group box names
Italics	Text emphasis and document titles
Blue underlined sans serif font (www.hp.com)	Web site addresses

Caution *Indicates that failure to follow directions could result in damage to equipment or data.*

Warning

Indicates that failure to follow directions could result in bodily harm or death.

Revision history

May 2002	First edition
October 2002	Second edition
April 2004	Third edition
May 2005	Fourth edition
July 2005	Fifth edition

1

Introduction

The objective of a site prep is to prepare your site for the successful and timely installation of your HP Disk Array XP128. Proper site preparation and maintenance is vital to the reliability of your HP Disk Array XP128. Consult with your HP representative specializing in the HP Disk Array XP128 for additional site prep information.

2

Site prep team and tasks

The HP service organization is committed to making sure you receive the maximum benefits from your HP Disk Array XP128. Brief descriptions of the HP team and how they can assist you are included in this chapter. You are also an integral part of the site prep team, and your responsibilities are also described here. The table on page 14 is a site inspection checklist and includes a reference for pertinent information.

The site prep team

The site prep planning team is responsible for determining site location and location size, ensuring that construction requirements and local codes are met, and scheduling all events related to site completion to prepare for the successful installation and maintenance of the HP Disk Array XP128. The site prep team consists of the following personnel:

The HP Sales Representative (SR)

The sales representative is your primary point of contact. A sales representative coordinates all the HP resources to ensure successful delivery and installation of your disk array.

The HP Customer Engineer (CE)

The HP CE is trained and experienced in the installation of your disk array. He or she has the tools, parts, and knowledge to install and maintain your HP Disk Array XP128. The CE will also assist you in determining your site prep requirements.

The HP Application Software Engineer (ASE)

The HP ASE is a software technical specialist trained in configuring your HP Disk Array XP128. The ASE can install and configure all software applications for your disk array.

The Customer

As part of the site prep planning team, your responsibilities include scheduling, planning, and preparing a suitable environment for the HP Disk Array XP128. Your site team may include a site specialist for your computer room, a site electrician, and other site personnel specializing in your site computer room. Responsibilities include proper:

- Physical space necessary for proper disk array function and maintenance activity, including space and weight limitations and system accessibility

- Electrical power input, including adherence to:
  local building codes
  local electrical codes
  local safety codes
- Connectors and receptacles, including
  hardware or cables
  network links
  telephone equipment
  equipment supplied by companies other than HP
- Environmental requirements including:
  temperature requirements
  humidity limitations
- Floor ventilation areas
- Cable access holes
- RJ-11 analog telephone lines for Phone Home capabilities

Site prep technical tasks

Use the following table as an action item checklist.

Customer Summary				
Customer:				
Contact:	Telephone:			
Address:	HP CE:			
Date:	Time:			
Safety		**Yes**	**No**	**Reference**
✓ when completed				
❑	Is there a fire protection system in the computer room?	❑	❑	page 18
❑	Are there any equipment servicing hazards?	❑	❑	page 18
Computer Room		**Yes**	**No**	**Reference**
✓when completed				
❑	Is there a copy of the existing floor plan?	❑	❑	page 19
❑	Is there a copy of the newly developed floor plan?	❑	❑	page 19
❑	Is there adequate space for airflow and maintenance needs?	❑	❑	page 19
❑	Is the computer room structurally complete?	❑	❑	page 19
❑	Is the raised floor adequate for equipment loading?	❑	❑	page 19
❑	Are there channels or cut-outs for cable routing?	❑	❑	page 22
❑	Is antistatic flooring installed?	❑	❑	page 25
❑	Is there a telephone jack for Phone Home configuration?	❑	❑	page 29
❑	Is there a telephone line for customer engineer use?	❑	❑	page 30
❑	Is there a private LAN available?	❑	❑	page 30

Electrical		**Yes**	**No**	**Reference**
✓when completed				
❑	Are two AC outlets (on different lines) available for the proposed equipment?	❑	❑	page 31
❑	Does the input voltage correspond to equipment specifications?	❑	❑	page 32
❑	Are the input circuit breakers adequate for equipment loads?	❑	❑	page 32
❑	Does the input frequency correspond to equipment specifications?	❑	❑	page 32
❑	Are lightning arresters installed?	❑	❑	page 39
❑	Have all sources of electrical interference been corrected?	❑	❑	
Air-Conditioning		**Yes**	**No**	**Reference**
✓ when completed				
❑	Can the temperature be maintained between 16° and 32°C?	❑	❑	page 54
❑	Can temperature changes be held to less that 10°C per hour?	❑	❑	page 54
❑	Can humidity level be maintained between 20% and 80%?	❑	❑	page 54
Building Access and Security		**Yes**	**No**	**Reference**
✓ when completed				
❑	Is there access control to the computer room?	❑	❑	page 59
❑	Is there access control for the customer site?	❑	❑	page 59
❑	Will any stair-walkers, lifts, ramps, floor coverings, or ladders be required to install the equipment? Define: _____	❑	❑	page 59
❑	Will the equipment fit through all doors, corridors, and in lifts, both in size and weight?	❑	❑	page 59
❑	Does the building have a loading dock? Maximum access height is _____m.	❑	❑	page 22

Site planning timetable

The following guidelines can be used to monitor the progress of your pre-installation preparation. The time between placing an order and actual arrival can vary, and we recommend conferring with your HP representative to determine the best estimated delivery dates for preparation of your site.

The following are items that may require several weeks of lead time to complete:

- Acquiring required power connectors
- Arranging for an electrician
- Adding or modifying air conditioning
- Building alterations
- Placing an order for data comm equipment

Due to potential delays, we recommend that the suppliers of the listed services be contacted as soon as you have placed your order:

- Schedule the site planning visit with your HP CE to discuss questions concerning site planning.
- Select an appropriate location for the disk array and create a plan outlining the physical arrangement of the equipment, including related furniture.

3

Preparing for installation

This chapter provides information for planning and preparing your site before and during installation of your HP Disk Array XP128.

Before installing your HP Disk Array XP128, your site data center computer room must meet the requirements described in this chapter.

Safety requirements

The following sections contain information to help you properly prepare your facility for the arrival of your disk array.

Site safety consideration

When making decisions concerning site safety, your first concern should be the safety of your personnel and then the safety of your equipment. Two major safety considerations for any computer site are fire safety and emergency power-off. If you have any questions about site safety, consult your HP CE, your insurance carrier, and local building inspectors for safety recommendations.

Fire safety

When considering fire safety, consult your insurance carrier and fire department for suggestions and recommendations. They can analyze your existing fire control systems, and advise you of any changes that may be needed. If you are building a new site, or modifying an old site, consult your local building codes for fire prevention and protection guidelines. You can also consult with your local HP CE and local fire inspectors for additional information.

Equipment servicing hazards

You, your HP CEs, and HP ASEs require safe access to the disk array. Along with the specifications listed in “General computer room requirements” (page 19), ensure that electrical or data communication cables do not create a safety hazard.

Electrical hazards

The disk array cabinet contains dangerous voltages. To prevent injury or death from electric shock, refer all electrical installation and service to qualified personnel.

General computer room requirements

The purpose of a computer room is to maintain an ideal environment for your computer equipment, including your HP Disk Array XP128. The following guidelines are recommended:

- Locate the computer room away from exterior walls of the building to avoid the heat gain from windows and exterior wall surfaces.
- When locating near exterior windows is unavoidable, use windows that are double or triple glazed and shaded to prevent direct sunlight from entering the computer room.
- Maintain the computer room at a positive pressure relative to the surrounding spaces to reduce the introduction of contaminants.
- Use a vapor barrier installed around the entire computer room envelope to restrain moisture migration.
- Caulk and vapor-seal all pipes and cables that penetrate the envelope.
- Use a 10-inch to 12-inch (25 to 31 mm) raised floor system for the most favorable room air distribution system if the under floor area is being used as part of the air circulation system.

Space planning

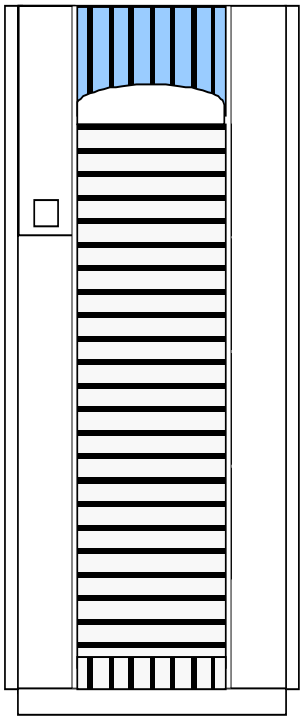
A site prep begins with your existing floor plan. The location of the new equipment should be selected and a new floor plan should be developed. You can use this section to satisfy the disk array physical requirements,

ensuring that your site is ready when the disk array arrives. Your floor plan should include the location of:

- Walls
- Cable paths, including lengths
- All equipment in your computer room, including furniture, cabinets, racks, data comm equipment, and systems
- Electrical outlets
- Immovable objects
- Floor vents

The HP Disk Array XP128

Your HP Disk Array XP128 is a high-performance disk array system. It is used to store large quantities of data in an efficient and secure manner. All components of the HP Disk Array XP128 are contained in a single cabinet, providing a complete storage system with a small equipment footprint.



Physical requirements

Dimensions

An HP Disk Array XP128 consists of a single cabinet with the approximate dimensions listed in the table below.

Minimum Dimensions	mm	in
Height	1860	73.6
Width	782	30.8
Depth	800	31.5

Weight

An HP Disk Array XP128 consists of a single cabinet. The table below provides approximate weights for a minimum and maximum configuration. The main factor that increases weight is the number of hard disk drives (HDDs) in the disk array.

Weight	kg	lbs
Minimum configuration	655	1441
Maximum configuration	796	1751

Specific component dimensions and weights

The following two tables provide the physical dimensions and weights for each HP Disk Array XP128 component. The values listed in these tables are approximate and should be used for general reference only. Use these values to estimate hallway and door clearances as well as floor strength for moving the disk array.

Component	Width	Depth	Height	Weight Fully Loaded
Disk array product alone	782 mm 30.8 in	800 mm 31.5 in	1860 mm 73.6 in.	796 kg 1751 lb
Disk array packaged*	890 mm 35 in	1000 mm 39.37 in	2020 mm 79.58 in	810 kg 1808 lb

* For shipment to locations outside the United States, Canada, and Germany, add 88 kg (194 lbs) for an international shipping crate.

Product	Description	kg	lb
A7890A	Array Control Processor Pair - Std. Perf.	3.6	7.9
A7893A	Additional Disk Port Switch Set	4.5	9.9
A7894A	Disk Path Expansion Kit	2.0	4.4
A7900A	146 GB 10k rpm FC Array Group	4.0	8.8
A7900S	146 GB 10k rpm FC Spare Disk Drive	1.0	2.2
A7901A	73 GB 15k rpm FC Array Group	4.0	8.8
A7901S	73 GB 15k rpm FC Spare Disk Drive	1.0	2.2
A7903A	300 GB 10k rpm FC Array Group	4.0	8.8
A7903S	300 GB 10k rpm FC Spare Disk	1.0	2.2
A7907A	SVP High Reliability Kit	14.5	31.9
A7909A	8-Port ExSA Channel Adapter Pair	4.2	9.2
A7909B	8-Port ExSA Channel Adapter Pair Enh.	4.2	9.2
A7910A	8-Port 1 Gbps FC/CA Adapter Pair	4.2	9.2
A7911A	4-Port 1-2 Gbps Autosensing FC/CA CHIP Pair	4.2	9.2
A7912A	8-Port 1-2 Gbps Autosensing FC/CA CHIP Pair	4.2	9.2
A7912B	8-Port 1-2 Gbps Enhanced FC CHIP Pair	4.2	9.2

Product	Description	kg	lb
A7913B	16-Port 1-2 Gbps Enhanced FC CHIP Pair	4.3	9.5
A7914A	8-Port 1 Gbps FICON - SW CHIP Pair	4.2	9.2
A7915A	8-Port 1 Gbps FICON - LW CHIP Pair	4.2	9.2
A7916B	8-Port 1-2 Gbps Enhanced FC - LW CHIP Pair	4.2	9.2
A7918A	2GB Cache Memory Module	0.2	0.4
A7921A	512 MB Shared Memory Module	0.05	0.1
A7922A	Array Control Processor Pair - High Perf.	3.6	7.9
A7928A	36 GB 15k rpm FC array group - 4 disks	4.0	8.8
A7928S	36 GB 15k rpm FC spare disk drive	1.0	2.2
A7929A	73 GB 10k rpm FC array group - 4 disks	4.0	8.8
A7929S	73 GB 10k rpm FC spare disk drive	1.0	2.2
A7934A	4GB Cache Memory Module	0.2	0.4
A7935A	1 GB Shared Memory Module	0.05	0.1
A7938A	8-Port Gigabit Ethernet iSCSI - SW CHIP Pair	4.6	10.1
A7939A	4-Port Gigabit Ethernet NAS - SW CHIP Pair	4.5	9.9

Service and cable routing space requirements

This section contains information about space requirements and floor loading for the HP Disk Array XP128.

Space planning

HP recommends that you prepare a revised floor plan showing the overall location and arrangement of your computer room, including the addition of your disk array. Enough room and lighting should be provided for people to work effectively on a daily basis and for periodic servicing of equipment.

Be sure to consider interconnecting cables and power cord lengths when planning your layout. Identify the location of all power outlets on the floor plan. Plan to keep cables away from traffic areas to help prevent accidents and equipment failures. Prior to installation, consult your site specialist responsible for your computer room.

HP strongly discourages the use of carpeting, including antistatic varieties, within 6.0 m (20 ft.) of the disk array. If this advice is not followed, you should place static discharge mats where personnel must walk before touching any part of the array. Failure to comply with this precaution can result in equipment damage through static discharge.

If you are planning to construct a new computer room or modify an existing site, first consult with your HP representatives and local contractors. It is important to plan the site with future expansion in mind, so equipment can be added without disturbing the computer operation.

Floor construction and loading

The computer room floor must be able to support the total weight of the equipment as well as localized weight at each caster or foot of the equipment cabinets. A common method of preparing an adequate floor for a computer room is to construct a raised floor over the building floor. The weight should be spread evenly and the flooring should provide an area through which interconnecting cables can be run conveniently and

unobtrusively. It should allow for optimum distribution of conditioned air. Raised floor access ramps must not exceed 10° slope.

To estimate floor strength, you should consider the following items:

- The total weight of the equipment (the unpacked and packaged weights are listed in this chapter)
- The total weight of furniture such as desks, chairs, and storage cabinets
- Total approximate weight of computer room personnel
- Weight of moving equipment such as forklifts, dollies, and so on.

Any questions regarding the adequacy of construction should be referred to and evaluated by a qualified structural engineer.

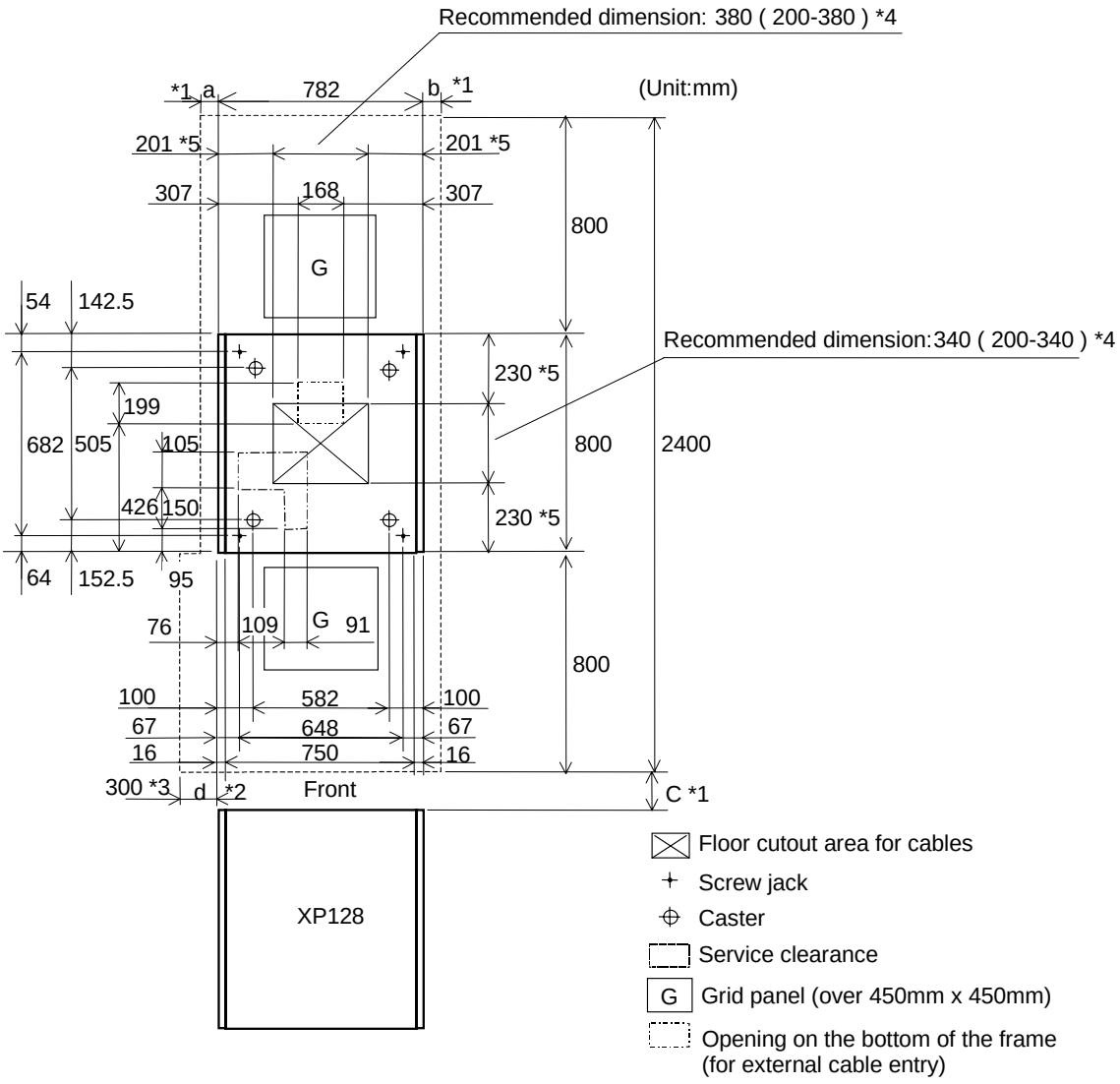
Caution *In addition to determining the adequacy of the computer site floor, ensure that all floors, stairs, and elevators which might be used when the disk array is moved to its destination can support the weight and size of the equipment. Failure to comply can result in damage to the equipment or the facility.*

Maximum floor loading

Maximum point floor loading is 500 kg (1102.3 lbs). The table below shows the floor load rating required for different service clearances (minimum configuration).

Floor Load Rating (kg/m^2)	Clearance (C) (m)				
	C=0	C=0.2	C=0.4	C=0.6	C=1.0
500	0.4	0.3	0.2	0.1	0
450	0.6	0.4	0.3	0.2	0.1
400	0.6	0.6	0.5	0.4	0.2
350	1.2	1.0	0.8	0.6	0.4
300	1.7	1.4	1.2	1.0	0.8

The following figure shows the recommended XP128 service clearances.



1. Clearance (a+b) depends on the floor load rating and clearance c.
2. Clearance (d) must be more than.0.28 m to allow for the DKC front door.

3. The clearance on the front left side must be 280 mm or wider in order to open the front door.
4. Dimensions in parentheses show the allowable range of floor cutout sizes. The preferred position of the floor cutout is in the center of the array. However, the position may be off-center as long as the cutout allows smooth entrance of all external cables and is within the allowable range.
5. This dimension varies depending on the floor cutout dimensions.

Minimum service clearances

The minimum service clearance is the smallest amount of additional floor space surrounding the array required in order to access the disk array for servicing. This space should be reserved for the disk array and never used for storage.

The minimum service access is:

- Rear: 800 mm (31.5 in)
- Side: 0 mm
- Front: 800 mm (31.5 in)

Data comm requirements

Route data comm cables away from areas with high static electric fields created by power transformers and heavy foot traffic. Use shielded data comm cables that meet approved industrial standards to reduce the effects of external fields.

Phone Home with Continuous Track

The HP Disk Array XP128 Phone Home capabilities detect and report problems even before they are noticed by operators and users. Continuous Track, a program that resides in the DKC, will phone “home” to the HP Storage Technology Center (STC) and provides:

- **Periodic “well” checkups**

  Every 24 hours, Continuous Track calls the HP Storage Technology Center. When a successful connection is made, a preconfigured set of files will be transferred from the DKC to the HP Storage Technology Center. Your HP CE will set the time of call and set up the files to be transferred. This checkup ensures the health of your disk array on a daily basis.

- **Incidental “sick” calls**

  When an error occurs, a service information message (SIM) is generated. The SIM is stored in the DKC for use by your HP service representative. The Continuous Track remote maintenance tool also reports the SIMs to the STC. SIMs are classified according to severity, and many SIMs do not require immediate attention. These SIMs are often addressed during routine maintenance, and are corrected before a failure occurs. Serious-level and acute-level SIMs are reported to the STC immediately to ensure that the problem is addressed as soon as possible.

To activate Phone Home, these requirements are necessary:

- Dedicated analog phone line
- An HP CE to configure Continuous Track

HP StorageWorks Remote Web Console XP and Comand View XP AE

HP StorageWorks Remote Web Console (RWC) is a web-based software application supplied with the XP128 disk array that permits you to connect to, monitor, and manage the array. For managing multiple XP disk arrays, you can upgrade to the optional Command View XP Advanced Edition (CVXP AE) which also runs in a web browser. Using either or both applications, you can remotely manage your HP Disk Array XP128 from any location, enabling a remote expert to participate in problem management. (If you already have an existing copy of Command View XP (CV), you can also use that to manage XP128 disk arrays.)

RWC runs on the SVP inside the disk array and can be accessed from any web browser on the LAN connected to the disk array. Command View and Command View XP AE both run on an optional PC Device Manager server that you must provide and install in your facility. You can use an existing PC server if it meets the requirements specified for the software.

Local Area Network (LAN)

To connect to your intranet (public LAN), your CE will directly connect your HP Disk Array XP128 to an available Ethernet port on your public LAN. To ensure network security, consult with your HP CE and your network administrator before selecting the location of your LAN drop.

Network hardware needed:

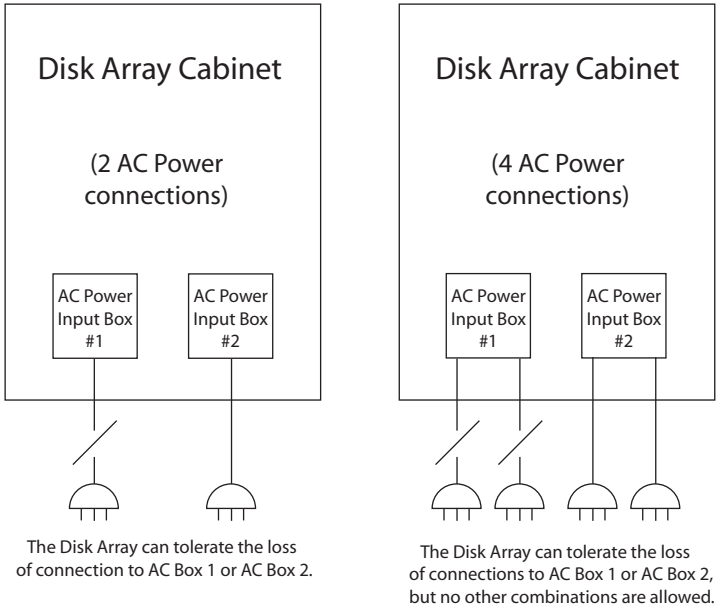
- One twisted pair (Cat 5) cable
- One available LAN drop on your intranet

Outside phone line

Recommendation Install a public voice phone line near your disk array. This phone line will be used by you and your HP CE for voice communication in and outside of your facility.

Electrical requirements

Power requirements are one of the most important considerations prior to installing your disk array. For disk array cabinets with two connections to AC power, if one input fails, the second input must be capable of supporting the entire current demand nominally shared by the two power connections. For disk array cabinets with four connections to AC power, the two power connections to AC Box 1 or the two power connections to AC Box 2 must be capable of supporting the entire current demand nominally shared by the four power connections. The figure below shows two examples of the fault-tolerant operation of the disk array.


Disk Array Cabinet
(2 AC Power connections)
AC Power Input Box #1
AC Power Input Box #2
Disk Array Cabinet
(4 AC Power connections)
AC Power Input Box #1
AC Power Input Box #2

The Disk Array can tolerate the loss of connection to AC Box 1 or AC Box 2.

The Disk Array can tolerate the loss of connections to AC Box 1 or AC Box 2, but no other combinations are allowed.

Line voltage

The line voltage (AC) at the wall power outlet is a function of the local power utility and your building power distribution network. Voltages outside the operating range of the disk array can cause intermittent system errors or a complete system shutdown. If required, the HP CE, along with

your electrician, can determine the line voltage and make recommendations. Avoid the use of a line voltage conditioner.

Make sure that the selected power distribution unit (if one is used) supports the correct voltage to support your entire system.

Branch circuit breakers

See "Branch circuit requirements" (page 42) for the specific branch circuit requirements for your power situation.

Three-phase branch circuit breakers

The power cords supplied with each HP Disk Array XP128 configured for three-phase power are sized for connection to a 30-amp circuit.

Single-phase branch circuit breakers

The power cords supplied with each HP Disk Array XP128 configured for single-phase power are sized for connection to a 30 or 50-amp circuit.

30-amp, single-phase power is available by special order only.

Frequency

AC line frequency is normally determined by your local power providers. In some cases, electrical power is supplied by motor-generators. Shifts in AC line frequency can cause system errors. Your HP CE can monitor the frequency of the input AC line power and make recommendations, if necessary.

AC line voltage requirements

The AC power requirements for your HP Disk Array XP128 listed are for each power cord. Each array frame has two or four power cords. In case of a failure of the power source for one cord, the power requirements and hence the current requirement for the remaining power cord will approximately double.

The table below lists the basic AC power requirements for a 50-amp, single-phase XP128.

Parameter	Nominal Rated Voltage (VAC)				
	200	208*	220	230	240
Minimum operating voltage (VAC)	184	191	202	212	221
Maximum operating voltage (VAC)	212	220	233	244	254
Rated line current per power cord (amps RMS)	16.2	15.1	14.9	14.3	13.8
Number of power cords	2	2	2	2	2
Recommended circuit breakers (amps)	50	50	50	50	50
Number of circuit breakers	2	2	2	2	2
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30
* 60 Hz only.					

The table below lists the basic AC power requirements for a 30-amp, single-phase XP128.

Parameter	Nominal Rated Voltage (VAC)				
	200	208*	220	230	240
Minimum operating voltage (VAC)	184	191	202	212	221
Maximum operating voltage (VAC)	212	220	233	244	254
Rated line current per power cord (amps RMS)	10.2	9.5	9.4	9.0	8.7
Number of power cords	4	4	4	4	4
Recommended circuit breakers (amps)	30	30	30	30	30
Number of circuit breakers	4	4	4	4	4
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30
* 60 Hz only.					

The table below lists the basic AC power requirements for a 30-amp, three-phase, XP128 (50 or 60Hz).

Parameter	Nominal Rated Voltage (VAC)							
	200	208*	220	230	240	380	400	415
Minimum operating voltage (VAC)	184	191	202	212	221	350	368	382
Maximum operating voltage (VAC)	212	220	233	244	254	403	424	440
Rated line current per power cord (amps RMS)	11.1	10.7	10.0	9.6	9.1	6.0	5.5	5.3
Number of power cords	2	2	2	2	2	2	2	2
Recommended circuit breakers (amps)	30	30	30	30	30	30	30	30
Number of circuit breakers	2	2	2	2	2	2	2	2
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30	30	30	30
* 60 Hz only.								

Safety and dedicated earth ground

The primary reason for earth grounding electrical systems is safety. The safety ground is required by the National Electric Code (USA) and most other local, regional, and national codes. In addition to safety ground, HP requires that a dedicated (earth reference) ground be installed as a common reference point for all system components. You should consult with your HP CE and your electrician to ensure that your electrical system meets all local and national safety codes.

Grounding requirements

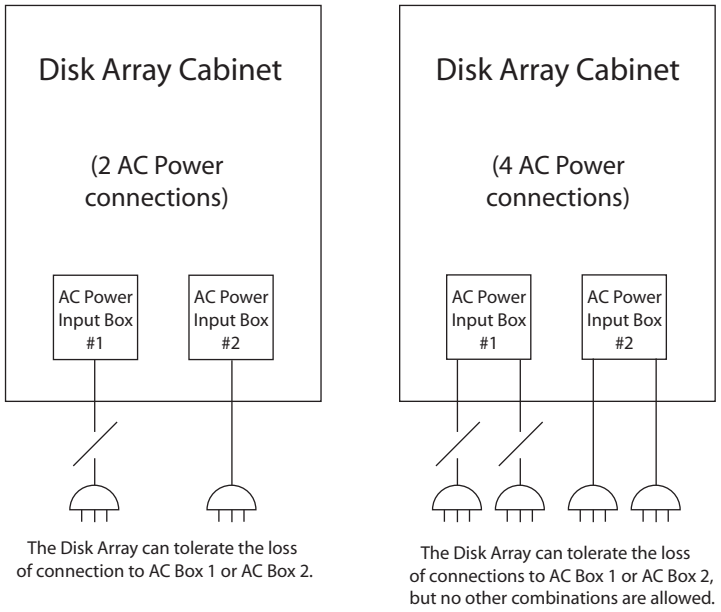
Your disk array must meet all of the following conditions:

- An insulated grounding conductor that is identical in size, insulation material, and thickness to the ungrounded branch-circuit supply conductors. It should be green, with or without yellow stripes, and is to be installed as a part of the branch circuit that supplies the unit or system. This means the ground conductor must be run in the same conduit, armored cable, or other cable bundle as the phase wires.
- Grounding as prescribed by your local country codes.
- The grounding conductor mentioned above should be grounded to earth at the service equipment or other acceptable building earth ground such as the building frames (in the case of a high rise steel frame structure).
- IT configured grounding systems are not certified for use with the XP128 as these grounding systems may not have solidly conductor-connected grounded power systems and/or they may have resistive impedance inserted in ground and/or neutral lines. The XP128 requires a solidly conductor-connected ground and may require a separate neutral in the case of WYE or STAR connections.

Receptacles

When receptacles are used to connect your disk array to AC power, they must include a dedicated ground connection that is insulated from the receptacle. It is important that the receptacle box be grounded with an additional ground connection that is separate from the dedicated ground. The additional ground can be hard conduit.

Each disk array cabinet has two or four separate connections to AC power. For disk array cabinets with two connections to AC power, each input must be capable of supporting the entire current demand for the cabinet. For disk array cabinets with four connections to AC power, the two inputs to AC Box 1 or the two inputs to AC Box 2 must be capable of supporting the entire current demand for the cabinet. The figure below shows two examples of the fault-tolerant operation of the disk array.


Disk Array Cabinet
(2 AC Power connections)
AC Power Input Box #1
AC Power Input Box #2
The Disk Array can tolerate the loss of connection to AC Box 1 or AC Box 2.
Disk Array Cabinet
(4 AC Power connections)
AC Power Input Box #1
AC Power Input Box #2
The Disk Array can tolerate the loss of connections to AC Box 1 or AC Box 2, but no other combinations are allowed.

Specific power plugs and receptacles are required for the XP128, depending on the power option you specify when ordering the HP Disk Array XP128. The power cords on 60 Hz cabinets are shipped with plugs attached. The power cords on 50 Hz cabinets are shipped without plugs. Customers are responsible for having the correct plugs and receptacles installed by an electrician in compliance with local electrical requirements and practices.

Caution *When installing the receptacles, the electrician must ensure that each receptacle has its own neutral (if required) and ground. Using the same neutral/ground for more than one circuit causes voltage loss and heat problems. It can create a fire hazard. A shared neutral conductor that fails open-circuit can cause overvoltage damage to equipment.*

The table below lists the plug and connector part numbers for 60 Hz configurations of the HP Disk Array XP128.

Power Source	Frequency	Breaker Rating	Plug	Connector
Single-phase	60 Hz	30 A	Russellstoll 3750DP	Russellstoll 3933 (Alt. 9C33U0) or 3753 (Alt. 9R33U0W)
		50 A	Russellstoll 9P53U2	Russellstoll 9C53U2 or 9R53U2W
Three-phase	60 Hz	30 A	Russellstoll 3760PDG	Russellstoll 3934 (Alt. 9C34U0) or 3754 (Alt. 9R34U0W)

The Russellstoll connectors are available through most industrial electrical distributors. HP has arranged for these connectors to also be available in stock from the distributors listed below. These distributors are able to ship worldwide and ship via customer preference.

Beck Electrical Supply
2775 Goodrick Avenue
Richmond, CA 94801 USA
Telephone: (800) 466-4395
Fax: (800) 466-5442
Contact: Ken Mogan
casales@beckelectric.com

Source Research, Inc. (SRI)
2160 Sunnydale Boulevard
Clearwater, FL 33765-2108 USA
Telephone: (800) 356-0259
Contact: Erik Peterson, telephone extension 302
http://www.sourceresearch.com/index.cfm

Power line transients

Heavy electrical loads from nearby machinery or equipment (elevators, electric welders, etc.) can cause intermittent system problems with sophisticated electronic equipment, even if that equipment is on a separate circuit breaker. When faced with these conditions, you should provide a separate, completely independent power panel with an isolated ground and circuit breaker coming directly from the main building power source or secondary power source.

If necessary, your HP CE can measure your power line noise level and make recommendations concerning the use of line treatment devices.

Maximum peak inrush and crest factor

The maximum peak inrush currents for the HP Disk Array XP128 are listed in the table below.

Power	Single-Phase	Three-Phase
30-amp	86 A for 10ms	N/A
50-amp	135 A for 10ms	135 A for 10ms

The crest factors for the HP Disk Array XP128 are listed in the table below.

Single-Phase	Three-Phase
2.27	1.94

Sources of electrical interference

Ensure that the disk array is protected from sources of electrical interference:

wall outlets	Convenience power outlets for building maintenance equipment (vacuum cleaners, floor buffers, etc.) must be wired from circuit breakers on a power panel separate from the computer system panel. The ground wires from these outlets must be connected to the normal building distribution panel and not to the system ground. If a separate power source and separate ground are not provided, operation of janitorial equipment can induce electrical noise and cause abnormal operation of the computer system. Your electrician can verify whether or not maintenance outlets are on separate panels.
lightning	In some geographical areas it may by advisable to install lightning protection for both personnel and computer systems. The principles of lightning protection and personnel safety are outlined in detail in the lightning protection code contained in the National Fire Protection Association (NFPA) Handbook.
vibration	Continuous vibration can cause a slow degradation of mechanical parts and, when severe, can cause data errors in disk drives. Mechanical connections such as printed circuit assembly (PCA) conductors, cable connectors, and processor backplane wiring can also be affected by vibrations.
electromagnetic interference	The disk array is specifically designed to reduce its susceptibility to radiated and conducted interference. Electromagnetic interference can cause a variety of system problems. Your HP CE can advise you about many of the most common causes of electromagnetic interference.

metal	If metal is used in the construction of the raised floor, ensure that there is a common ground connection between the raised floor and main floor to avoid possible build up of different voltage potentials. Failure to comply can result in serious injury to personnel and damage to equipment.
flammable materials	Fundamental safeguards for disk arrays should include a site well away from any sources of potential damage. The system should not be installed or operated in an environment where there is a risk of fire or explosion due to the presence of highly flammable gases, volatile liquids, or combustible dust.
airborne contaminants	Airborne contaminants and particles of a certain size and hardness can damage your disk arrays. Some of the most common contaminants are dust, smoke, ash, eraser debris, food crumbs, and salty air. Your HP CE can assist you in determining whether or not you need be concerned about airborne contaminants. Also, see “Dust and pollution control” (page 53) and “Metallic particulate contamination” (page 53).

Three-phase AC cabling for USA

Each three-phase HP Disk Array XP128 has two main disconnect devices (two main breakers for dual power lines) so that AC power to the unit can be supplied from separate power distribution panels with two power-supply cords.

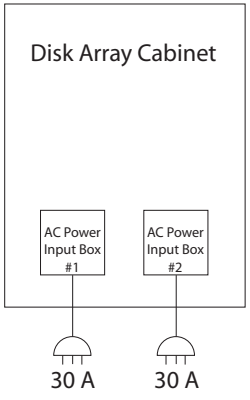
Trained service personnel should be present whenever the disk array is being connected to a new power source for the first time.

Connecting the external power supply cord

Three-phase HP Disk Array XP128s are factory-configured for 30-amp power.

30-amp, three-phase power

When the disk array uses 30-amp, three-phase input power, HP Disk Array XP128s have two power cords as shown in the figure below. If one power source malfunctions, the other power source assumes the total load, providing uninterrupted operation. HP recommends that each power cord have a separate electrical circuit as its source in case of a circuit failure. Each power-supply cord is supplied with an attachment plug type Russellstoll 3760PDG. Be sure to install Russellstoll 3934 (alternate, 9C34U0) or 3754 (alternate, 39R34U0W) socket receptacles between the power distribution panel of the building and the attachment plugs for the XP128.



The power cords provided with your 30-amp, three-phase disk array are non-shielded, type ST or equivalent, with four #8 AWG (minimum) conductors terminated at one end with an assembled plug connector.

Branch circuit requirements

To protect your disk array, your building must be wired correctly. Each supply (“hot”) conductor must be protected by a short-circuit protective device and by an overcurrent protective device. The current specifications for the overcurrent protective devices required for three-phase operation are listed in the table on page 34.

All protective devices must comply with national standards of the country where the units are to be installed. If a protective device interrupts any supply conductor, it must also interrupt all other supply conductors.

Overcurrent protection is not required for the neutral conductor of this unit.

Only 50 Hz, three-phase configurations have a neutral conductor.

Three-phase AC cabling for Europe

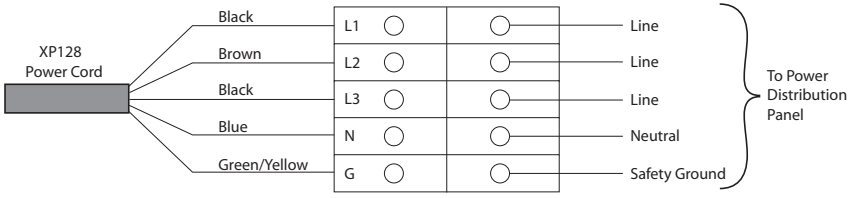
Each three-phase HP Disk Array XP128 has two main disconnect devices (two main breakers for dual power lines) so that AC power to the unit can be supplied from separate power distribution panels with two power-supply cords.

Trained service personnel should be present whenever the disk array is being connected to a new power source for the first time.

Connecting the power supply cords

All 50 Hz, European HP Disk Array XP128 cabinets are shipped with unterminated power cords. Your electrician must select and install the correct power plug. Power cords of type H07RN-F or equivalent, with five 6 mm^2 conductors per cord, are provided with the unit.

Caution *Be sure to connect the power cords to the distribution panel as shown in the figure below. Improper wiring of the neutral conductor may cause damage to your disk array. To reduce the risk of a wrong connection, you should use a plug and socket that is approved for this disk array. It is your electrician's responsibility to select and install the proper plug.*



When connecting to 380 to 415-volt service, a WYE configuration with neutral and ground conductors (in addition to the three-phase wires — a total of five wires) is required.

High leakage current can occur between the power supply and the unit. To avoid electrical shock, ensure that the protective earth connection is made before the supply connections.

Branch circuit requirements

When the supplied line to line voltage is in the 380 to 415-volt range, the connection must be a five-wire WYE or STAR connection.

To protect your disk array, your building must be wired correctly. Each supply (“hot”) conductor should be protected by a short-circuit protective device and by an overcurrent protective device. The current specifications for the overcurrent protective devices required for three-phase operation are listed in the table on page 34.

The protective device must comply with national standards of the country where the units are to be installed. If a protective device interrupts a supply conductor, it must also interrupt all other supply conductors.

Overcurrent protection is not required for the neutral conductor.

Single-phase AC cabling for USA

When configured for 50-amp, single-phase power, the HP Disk Array XP128 cabinet has two power cords and two main disconnect devices so that AC power can be supplied from separate power distribution panels. When configured for 30-amp, single-phase power, each HP Disk Array XP128 cabinet has four power cords and four main disconnect devices.

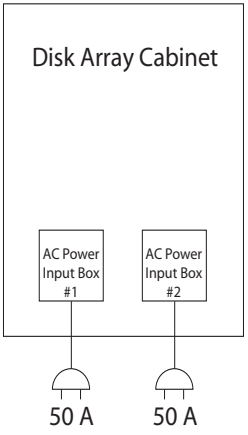
Caution *Trained service personnel should be present whenever the disk array is being connected to a new power source for the first time.*

Connecting the power supply cords

The HP Disk Array XP128 can be factory-configured for 50-amp or 30-amp, single-phase power.

50-amp, single-phase power

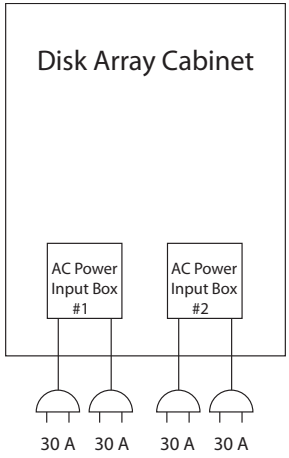
The 50-amp HP Disk Array XP128 cabinet has two power-supply cords with attachment plug type Russellstoll 9P53U2 as shown in the figure below. Be sure to install Russellstoll 9C53U2 or Russellstoll 9R53U2W socket receptacles between the power distribution panel of the building and the attachment plugs for the unit.



The power cords provided with your disk array are non-shielded, type ST or equivalent with three #6 AWG (minimum) conductors terminated at one end with an assembled 9P53U2 plug connector.

30-amp, single-phase power

The 30-amp HP Disk Array XP128 cabinet has four power-supply cords with attachment plug type Russellstoll 3750DP as shown in the figure below. Be sure to install Russellstoll 9C33U0 or 9R33U0W socket receptacles between the building's power distribution panel and the attachment plugs for each unit.



The power cords that are provided with your disk array are nonshielded, type SJT or equivalent with three #10 AWG (minimum) conductors that are terminated at one end with an assembled plug connector.

Branch circuit requirements

To protect your disk array, your building must be wired correctly. Each supply (“hot”) conductor must be protected by a short-circuit protective device and by an overcurrent protective device. The current specifications for the overcurrent protective devices required for single-phase operation are listed in the table on page 33.

The protective device must comply with national standards of the country where the units is to be installed (USA). If a protective device interrupts a supply conductor, it must also interrupt all other supply conductors.

Note In many cases, local codes do not allow a branch circuit fitted with a 50-amp receptacle or connector to be protected by an overcurrent protection device with a rating lower than 50 amps. You can order your HP Disk Array XP128 with the 30-amp power option to comply with these local codes. Your electrician knows the appropriate code requirements for your location/site.

Single-phase cabling for Europe

When configured for 50-amp, single-phase power, the HP Disk Array XP128 cabinet has two power cords and two main disconnect devices so that AC power can be supplied from separate power distribution panels. When configured for 30-amp, single-phase power, the HP Disk Array XP128 cabinet has four power cords and four main disconnect devices.

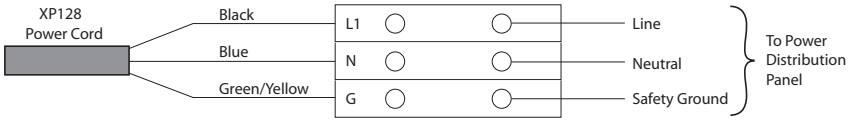
Caution *Trained service personnel should be present whenever the disk array is being connected to a new power source for the first time.*

Connecting the power supply cord

50-amp power cords

The 50-amp HP Disk Array XP128 cabinet has two power-supply cords. The power cords included with the unit are type H07RN-F or equivalent with three 10 mm^2 conductors.

Caution *Be sure to connect the power cords to the distribution panel as shown in the figure below. Improper wiring of the neutral conductor may cause damage to your disk array. To reduce the risk of a wrong connection, you should use a plug and socket that is approved for this disk array. It is your electrician's responsibility to select and install the proper plug.*



30-amp power cords

The 30-amp HP Disk Array XP128 cabinet has four power-supply cords. The power cords included with the unit are type H07RN-F or equivalent with three 6 mm^2 conductors.

High leakage current may occur between the power supply and the unit. To avoid an electrical shock, be sure the protective earth connection is made before the supply connections.

Branch circuit requirements

To protect your disk array, your building must be wired correctly. Each supply (“hot”) conductor must be protected by a short-circuit protective device and by an overcurrent protective device. The current specifications for the overcurrent protective devices required for single-phase operation are listed in the tables on page 33.

The protective device must comply with national standards of the country where the units is to be installed. If a protective device interrupts a supply conductor, it must also interrupt all other supply conductors.

Note In many cases, local codes do not allow a branch circuit fitted with a 50-amp receptacle or connector to be protected by an overcurrent protection device with a rating lower than 50 amps. You can order your HP Disk Array XP128 with the 30-amp power option to comply with these local codes. Your electrician knows the appropriate code requirements for your location/site.

Uninterruptible Power Supply (UPS)

Caution *This uninterruptible power supply (UPS) reference is for a product UPS implementation. If you are planning or already have a sitewide UPS, Hewlett-Packard recommends against a product UPS powered by a sitewide UPS for the XP128.*

Most HP Disk Array XP128 units are installed in data centers where an uninterruptible power supply (UPS) strategy is already in place. However, if you are making your first large disk array purchase, you may have a need for a separate UPS solution. HP references the Silcon DP300 series UPS solution. The Silcon DP300 is a product from American Power Conversion Corp (APC), manufacturers of uninterruptible power systems.

UPS features

The APC UPS, Silcon DP300 series, provides the following feature set:

- Protection against short line transients
- Continued availability during short duration power failures (a minimum of 30 minutes for a fully-configured system)
- Stable AC output voltage
- LCD display unit with ability to display key AC input/output parameters, alarm log, events log and programming functions
- Communications interface option for communicating a remote UPS shutdown through the serial port connection.

UPS limitations

While the UPS will provide uninterrupted power to the XP array in the event of a power failure, once the battery runtime is exceeded, it will shut down, resulting in a loss of AC power to the array. The UPS does have the ability to communicate an oncoming shutdown to the host via the Silcon

Triple Chassis. The host can then pass this message in-band to the XP array using the “xppf” program.

Power requirements: single secondary input (primary offline)

The values in the table below are based on a worst-case voltage (rated voltage –10%) and a maximum configuration for disk array control and disk frames. A phase imbalance of 15% is also included in the calculation.

Input (Vac)	Power Required
208	25.0 A (9.0kVA)
400	16.3 A (11.3k VA)

Reference supplier information

American Power Conversion
32 Fairgrounds Road
West Kingston, RI 0289

Phone Numbers:

Technical Support & Product Info.
1-800-800-4272

Corporate
1-800-788-2208
1-401-789-5735

To find out more about the recommended American Power Conversion UPS, travel to the APC web site:

www.apcc.com

You can also contact your HP service representatives for specific configuration needs for your area.

Environmental requirements

The environmental specifications for operating your disk array must be satisfied prior to installation.

Air conditioning ducts

Use separate computer room air conditioning duct work. If it is not separate from the rest of the building, it might be difficult to control cooling and air pressure levels. Duct work seals are important for maintaining a balanced air conditioning system and high static air pressure. Adequate cooling capacity means little if the direction humidity levels increase when the ducts are exposed to warm air.

Humidity

Maintain proper humidity levels. High humidity levels causes galvanic actions to occur between some dissimilar metals. This eventually causes a high resistance between connections, leading to equipment failure.

Caution *Low humidity tends to increase electrostatic discharge (ESD) voltage potential. ESD can cause component damage during servicing operations.*

Static charges (voltage levels) occur when objects are separated or rubbed together. The voltage level of a static charge is determined by the following factors:

- Types of materials
- Relative humidity
- Rate of change or separation

Follow these precautions to minimize possible ESD-induced failures in your computer room:

- Install conductive flooring (conductive adhesive must be used when laying tiles).
- Use conductive wax if waxed floors are installed.
- Ensure that both equipment and flooring are properly grounded and are at the same ground potential.
- Use conductive tables and chairs.
- Store spare electric parts in antistatic containers.
- Maintain recommended humidity level and airflow rates.

Low humidity levels are often the result of the facility heating system and occur during the cold season. Most heating systems provide air with a low humidity level, unless the system has a built-in humidifier.

Dust and pollution control

For trouble free operation, disk drives require a dust-free environment, The HP Disk Array XP128 disk drives are protected from dust particles by mechanical air filters designed to trap large dust particles. Smaller particles can pass through some filters, and, over a period of time, can cause problems in mechanical parts. Small dust particles can be prevented from entering the computer room by maintaining its air conditioning system at a high static air pressure level.

Metallic particulate contamination

Metallic particulates can be especially harmful around electronic equipment. This type of contamination may enter the data center environment from a variety of source, including but not limited to raised floor tiles, worn air conditioning parts, heating ducts, rotor brushes in vacuum cleaners, or printer component wear. Because metallic particulates conduct electricity, they have an increased potential for creating short circuits in electronic equipment.This problem is aggravated by the increasingly dense circuitry of electronic equipment.

Over time, very fine whiskers of pure metal can form on electroplated zinc, cadmium, or tin surfaces. If these whiskers are disturbed, they may break off and become airborne, possibly causing failures or operational interruptions. For over 50 years, the electronics industry has been aware of the relatively rare but possible threat posed by metallic particulate contamination. During recent years, a growing concern has developed in computer rooms where these conductive contaminants are formed on the bottom of some raised floor tiles.

Although this problem is relatively rare, it may be an issue in your computer room. Since metallic contamination can cause permanent or intermittent failures on your electronic equipment, Hewlett-Packard strongly recommends that your site be evaluated for metallic particulate contamination before the installation of electronic equipment.

Temperature and humidity specifications

When the disk array is operating, the recommended temperature range is 21°C to 24°C and recommended relative humidity range is (at 22°C) between 40 to 55 percent. The following table lists the full range of temperature, humidity, and vibration specifications for the HP Disk Array XP128. The vibration and shock specifications apply to all three axes.

Caution *No condensation in or around the HP Disk Array XP128 should be observed under any conditions.*

Specification	Operating[1]	Nonoperating[2]	Shipping and Storage[3]
Temperature (°C)	16 to 32	–10 to +43	–25 to +60
Relative humidity (%)[4]	20-80	8-90	5-95
Max wet bulb (°C)	26	27	29
Temperature deviation (°C/hour)	10	10	20
Vibration[5]	0.25mm, 5-10Hz 0.05G, 10-300Hz	2.5mm, 5-10 Hz 0.5G, 10-70 Hz 0.05mm, 70-99 Hz 1.0G, 99-300 Hz	0.5, 15 min.[6] at four most severe resonance between 5-200Hz
Shock		8G, 15ms	Horizontal:[7] incline impact: 1.22m/s Vertical:[8] rotational edge: 0.15m

1. Environmental specification for operating condition should be satisfied before the disk subsystem is powered on. Maximum temperature of 32ºC should be strictly satisfied at the air inlet portion. The recommended temperature range is 21~24ºC.
2. Nonoperating condition includes both packing and unpacking conditions unless otherwise specified.
3. On shipping/storage condition, the product should be packed with factory packing.
4. No condensation in and around the drive should be observed under any conditions.
5. The specifications apply to all three axes.
6. See ASTM D999-86, *Standard Methods for Vibration Testing of Shipping Containers*.
7. See ASTM D880-86, *Standard Methods of Incline Impact Test for Shipping Containers*.
8. See ASTM D775-80, *Standard Methods for Drop Test for Loaded Boxes*.

Heat dissipation

The table below lists the heat dissipation specifications of the HP Disk Array XP128 in a maximum configuration.

Power consumption (kVA)	5.42
Heat dissipation (kW)	5.03
BTUs per hour	17,164
kcal per hour	4,326

Altitude

When operating the HP Disk Array XP128, the maximum altitude is 3,000 meters. For nonoperational situations, the maximum altitude is 4,000 meters.

Acoustics

Computer equipment and air conditioning blowers cause computer rooms to be noisy. Ambient noise level in a computer room can be reduced as follows:

dropped ceiling	Cover with a commercial-grade fire-resistant, acoustic rated, fiberglass ceiling tile.
sound deadening	Cover the walls with sound-deadening material.
removable partitions	To be most effective, use foam rubber models.

The acoustic emission specifications for the HP XP128 Disk Array are:

- 7.63 Bels (A) sound power
- 59.8 dB (A) sound pressure, operator position

Delivery space requirements

There should be enough clearance to move equipment safely from the receiving area to the computer room. Permanent obstructions, such as pillars or narrow doorways, can cause equipment damage.

Delivery plans should include the possible removal of walls or doors. The physical dimensions are summarized on page 22.

4

Receiving your HP Disk Array XP128

Your HP Disk Array XP128 is shipped directly from HP. If your disk array is part of a system order, HP coordinates the shipment of equipment from all locations so that it arrives at your site at approximately the same time.

In some cases, factors beyond the control of HP can cause delivery delays. If you have not received your equipment within a two-week period, notify your HP sales representative. The HP sales representative will trace your order and expedite delivery.

Caution *Be sure to allow for size and weight in regard to placing the disk array at its installation site. Refer to "Dimensions" (page 22) for specific size and weight values.*

Checking for shipping shortage and damage

As your disk array arrives, check the carrier's bill of lading carefully to ensure that all items shipped by HP are delivered. Notify the carrier immediately if there are any discrepancies or items missing.

Inspect all of the shipping containers for signs of damage before actually unpacking the equipment. Some typical signs of shipping damage are dents, scratches, cuts, or water marks. If any damage is found, note on the bill of lading that there is apparent damage subject to inspection. Arrange for the carrier's representative and a representative from Hewlett-Packard to be present when the item in question is unpacked.

Regardless of the circumstances, the HP CE will take immediate action to replace any damaged components without waiting for the settlement of claims.

Unpacking the cartons

The equipment cartons can be unpacked at your convenience; it is your responsibility to have the equipment unpacked and moved to its proper installation location prior to the day of installation.

The disk array frame is very heavy. In a maximum configuration, it weighs more than 1700 pounds. It is recommended that three (3) people unpack and move this equipment to avoid injury.

Retain the packing list (invoice) for each carton that is to be unpacked and ensure that each item on the list can be accounted for. Contact your HP sales representative immediately if there are any missing items, or if the items are not the same as you ordered.

Leave the sealed cartons or packages of CDs, cables, and any other installation hardware intact for the HP CE. Your HP CE and HP ASE will install and configure the disk array.

Glossary

ACP	Array control processor. The ACP handles the passing of data between the cache and the physical drives held in the DKU. ACPs work in pairs, providing a total of eight SCSI buses. Each SCSI bus associated with one ACP is paired with a SCSI bus on the other ACP pair element. In the event of an ACP failure, the redundant ACP takes control. Both ACPs work together sharing the load.
AL	Arbitrated loop.
AL-PA	Arbitrated loop physical address.
allocation	The ratio of allocated storage capacity versus total capacity as a percentage. “Allocated storage” refers to those LDEVs that have paths assigned to them. The allocated storage capacity is the sum of the storage of these LDEVs. Total capacity refers to the sum of the capacity of all LDEVs on the disk array.
array group	A group of 4 or 8 physical hard disk drives (HDDs) installed in an XP disk array and assigned a common RAID level. RAID1 array groups are made up of 4 HDDs (2D+2D). A RAID1 group is two 4 HDD array groups concatenated together (4D+4D). RAID5 array groups are made up of 4 or 8 HDDs, depending on whether they are RAID5 3D+1P or RAID5 7D+1P, respectively. All RAID6 array groups are made up of 8 HDDs (6D+2P).
ASE	Application System Engineer.
BC	The HP StorageWorks Business Copy XP software program, which enables you to maintain up to nine internal copies of logical volumes on the disk array.

C-Track	The HP StorageWorks Continuous Track XP software program, which detects internal hardware component problems on a disk array and automatically reports them to the HP STC.
CA	The HP StorageWorks Continuous Access XP program, which enables you to replicate data stored on a local disk array to a remote disk array.
cache	Very high speed memory that is used to speed I/O transaction time. All reads and writes to the XP array family are sent to the cache. The data is buffered there until the transfer to/from physical disks (with slower data throughput) is complete. The benefit of cache memory is that it speeds I/O throughput to the application. The larger the cache size, the greater the amount of data buffering that can occur and the greater throughput to the applications. XP arrays support a range of cache memory. In the event of power loss, battery power holds up the contents of cache for up to 36 hours.
CE	Customer engineer.
channel adapter (CHA)	The channel adapter (CHA) provides the interface between the disk array and the external host system. Occasionally this term is used synonymously with the term channel host interface processor (CHIP).
channel host interface processor (CHIP)	Synonymous with the term channel adapter (CHA).
channel processor (CHP)	The processors located on the channel adapter (CHA). Synonymous with CHIP.
command device	A volume on the disk array that accepts Continuous Access or Business Copy control operations which are then executed by the disk array.
control unit	To organize the storage space attached to the DKC, you can group similarly configured logical devices (LDEVs) with unique control unit images (CUs). CUs are numbered sequentially. The disk array supports a certain number of CUs, depending on the disk array model. Each CU can manage multiple LDEVs. Therefore, to uniquely identify a particular LDEV requires both the CU number and the LDEV number.

CU Control unit.

CVS Custom volume size. CVS devices (OPEN-x CVS) are custom volumes configured using array management software to be smaller than normal fixed-size OPEN system volumes. Synonymous with volume size customization (VSC).

disk adapter (DKA) Synonymous with the term ACP.

disk unit (DKU) The array hardware that houses the disk array physical disks.

disk controller (DKC) The array hardware that houses the channel adapters and service processor (SVP).

disk recovery and restore unit (DRR) The unit responsible for data recovery and restoration in the event of a cache failure.

disk group The physical disk locations associated with a parity group.

disk type The manufacturing label burned into the physical disk controller firmware. In most cases, the disk type is identical to the disk model number.

emulation modes The logical devices (LDEVs) associated with each RAID group are assigned an emulation mode that makes them operate like OPEN system disk drives. The emulation mode determines the size of an LDEV.

OPEN-3:	2.46 GB
OPEN-8:	7.38 GB
OPEN-9:	7.42 GB
OPEN-E:	13.56 GB
OPEN-K:	Not available on XP128 arrays
OPEN-L:	36 GB
OPEN-M:	Not available on XP128 arrays
OPEN-V:	User-defined custom size

EPO Emergency power-off.

ESCON Enterprise System Connection (the IBM trademark for optical channels).

expanded LUN A LUN is normally associated with only a single LDEV. The LUSE feature allows a LUN to be associated with 1 to 36 LDEVs. Essentially, LUSE makes it possible for applications to access a single large pool of storage.

	The LUSE feature is available when the HP StorageWorks LUN Configuration Manager product is installed.
ExSA	Extended serial adapter.
failover	Disconnecting a failed unit or path and replacing it with an alternative unit or path in order to continue functioning.
FC	Fibre Channel.
FC-AL	Fibre Channel arbitrated loop.
FCP	Fibre Channel Protocol.
fence level	A level for selecting rejection of a write I/O request from the host according to the condition of mirroring consistency.
FICON	IBM mainframe Fiber Optic Connection.
GB	Gigabytes.
GLM	Gigabyte link module.
HA	High availability.
HBA	Host bus adapter. A built-in function or a card installed in a PC or other host computer to enable connection of the host to the SAN.
host mode	Each port can be configured for a particular host type. These modes are represented as two-digit hexadecimal numbers. For example, host mode 08 represents an HP-UX host.
hot standby	Using two or more servers as a standby in case of a primary server failure.
HP	Hewlett-Packard Development Company.
I/O	Input/output (applies to an operation or device).
LAN	Local area network.
LD, LDEV	Logical device. An LDEV is created when a RAID group is carved into pieces according to the selected host emulation mode (that is, OPEN-3, OPEN-8, OPEN-9). The number of resulting LDEVs depends on the selected emulation mode. The term LDEV is often used synonymously with the term volume.

LED	Light emitting diode.
local disk	A disk in the host.
LU	Logical unit.
LUN	Logical unit number. A LUN results from mapping a SCSI logical unit number, port ID, and LDEV ID to a RAID group. The size of the LUN is determined by the emulation mode of the LDEV, and the number of LDEVs associated with the LUN. For example, a LUN associated with two OPEN-3 LDEVs has a size of 4,693 MB.
LUSE	Logical unit size expansion. See also *Expanded LUN*.
m	Meters.
MB	Megabytes.
MCU	Main control unit.
MIX	A circuit board in the disk control unit that includes disk adapters and channel adapters for interfacing disk drives and the host to cache memory.
mirroring consistency	The consistency (usability) of data in a volume (for example, S-VOL).
mm	Millimeters.
MR	Magnetoresistive.
ms, msec	Milliseconds.
mutual hot standby system	Two servers that are poised to cover for each other if necessary.
NAS	Network attached storage.
node	Logically speaking, an environment where instances can be executed. Physically, a processor, which is an element of a cluster system.
NVS	Nonvolatile storage.
OFC	Open Fibre Control.
OLM	Optical link module.

OS	Operating system.
PA	Physical address.
parity group	A parity group is a disk configuration in which multiple disks work together to provide redundancy. Synonymous with “array group.”
partition	Dividing a specific physical disk into two or more areas as if there are two or more physical disks.
path	Paths are created by associating a port, a target, and a LUN ID with one or more LDEVs.
PCI	Power control interface or peripheral component interconnect.
port	A physical connection that allows data to pass between a host and the disk array. The number of ports on an XP disk array depends on the number of supported I/O slots and the number of ports available per I/O adapter. The XP family of disk arrays supports Fibre Channel (FC) ports as well as other port types. Ports are named by port group and port letter, such as CL1-A. CL1 is the group, and A is the port letter.
P-P	Point-to-point.
PS	Power supply.
RS	Russellstoll®, a brand of electrical plugs and receptacles manufactured by Thomas & Betts Corporation.
RAID	Redundant array of independent disks.
RAID group	See “array group.”
RAID level	A RAID Level is one of the ways that disk drives are grouped together to improve performance, data availability/reliability or both. RAID levels are defined from RAID0 to RAID6. HP StorageWorks Disk Arrays in the XP product family support RAID1, RAID5 and RAID6. Not all of these RAID levels are supported by all XP family members. Consult the owner's guide or your HP representative for the details of which RAID levels are supported by your specific XP disk array.
RAM	Random access memory.

RM	HP StorageWorks RAID Manager XP, a command line interface for managing XP arrays.
R-SIM	Remote service information message.
R/W, r/w	Read/write.
script file	A file containing a shell script.
SCSI	Small computer system interface.
shell script	A command sequence executed by a UNIX shell.
sidefile	An area of cache used to store the data sequence number, record location, record length, and queued control information.
SIM	Service information message.
SMI-S	Storage Management Initiative Specification.
SMS	System managed storage.
SNMP	Simple Network Management Protocol.
SSID	Storage subsystem identification.
STC	HP Storage Technology Center.
SVP	Service processor, which is the PC built into the disk controller. The SVP provides a direct interface into the disk array. *SVP use is reserved for HP support representatives only.*
TB	Terabyte.
TCP/IP	Transmission control protocol/Internet protocol
TID	Target ID.
VSC	Volume size customization. Synonymous with CVS.
VOLID	Volume ID.
volume	Synonymous with LDEV.

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